DTU INDUSTRIENS FOND

reManuFactory

Ensuring circularity through full-cycle technology deployment and scaling

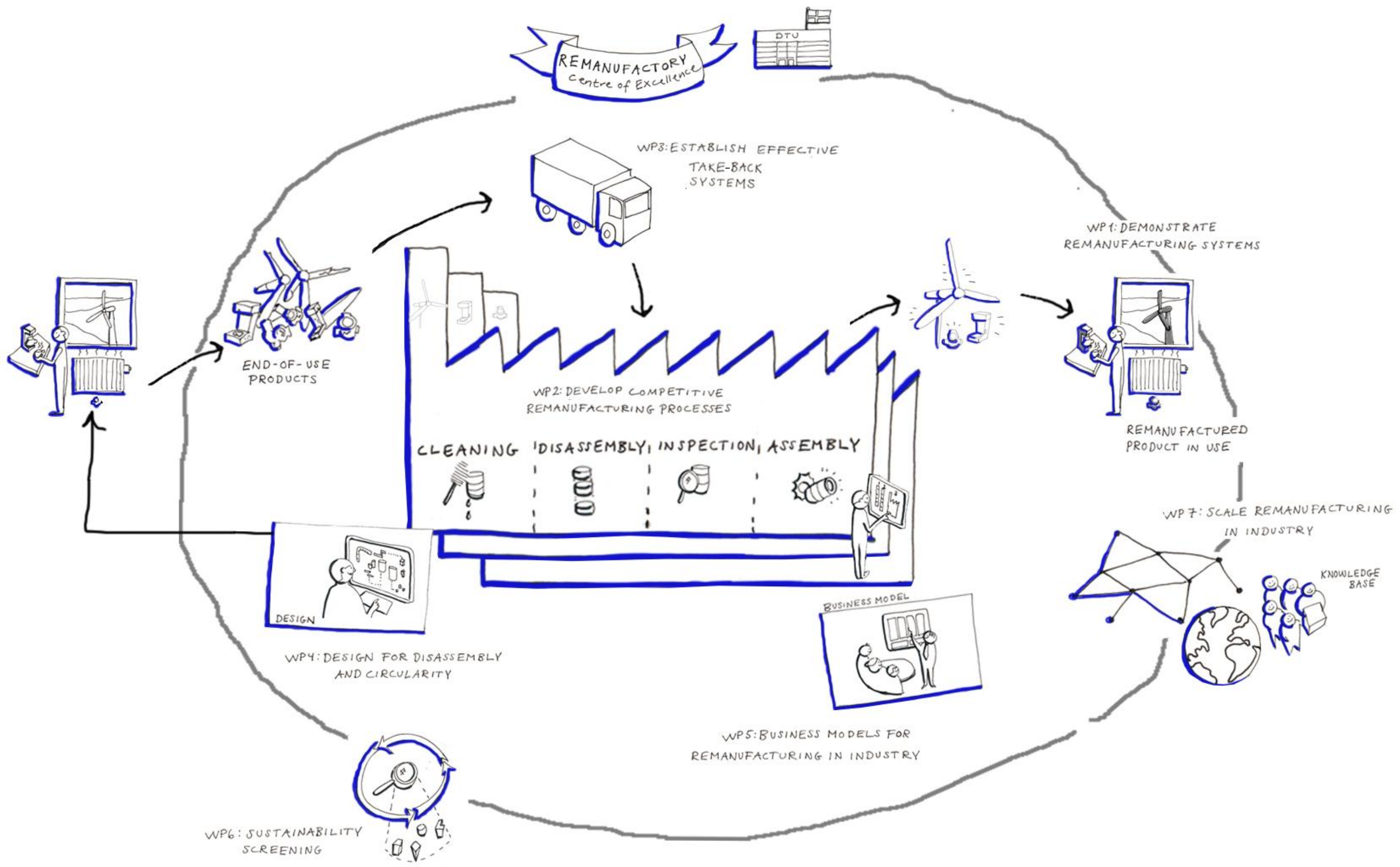
Technology + Talent + Knowledge + Network + Demonstration = Transformation + Scaling

ReManuFactory project presentation at DTI,
25th November 2025

DTU

REMANUFACTORY

GOAL:
Boost the remanufacturing scalability potential in Danish manufacturing industry



T

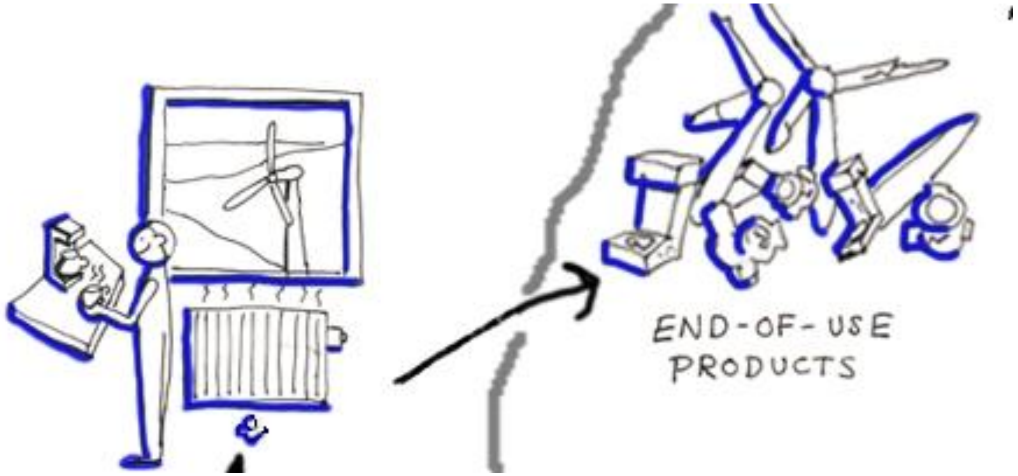
REMANUFACTORY

GOAL:
Boost the remanufacturing scalability potential in Danish manufacturing industry

T

REMANUFACTORY

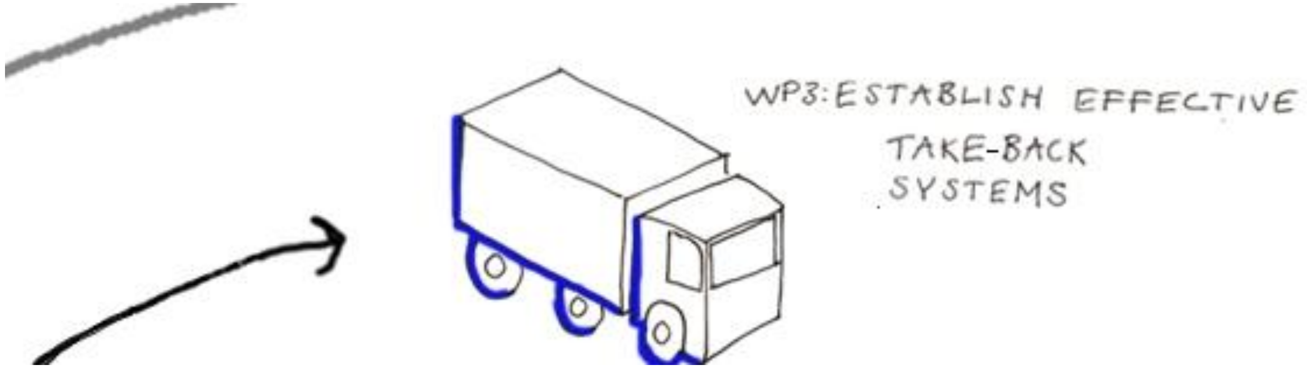
GOAL:
Boost the remanufacturing scalability potential in Danish manufacturing industry



T

REMANUFACTORY

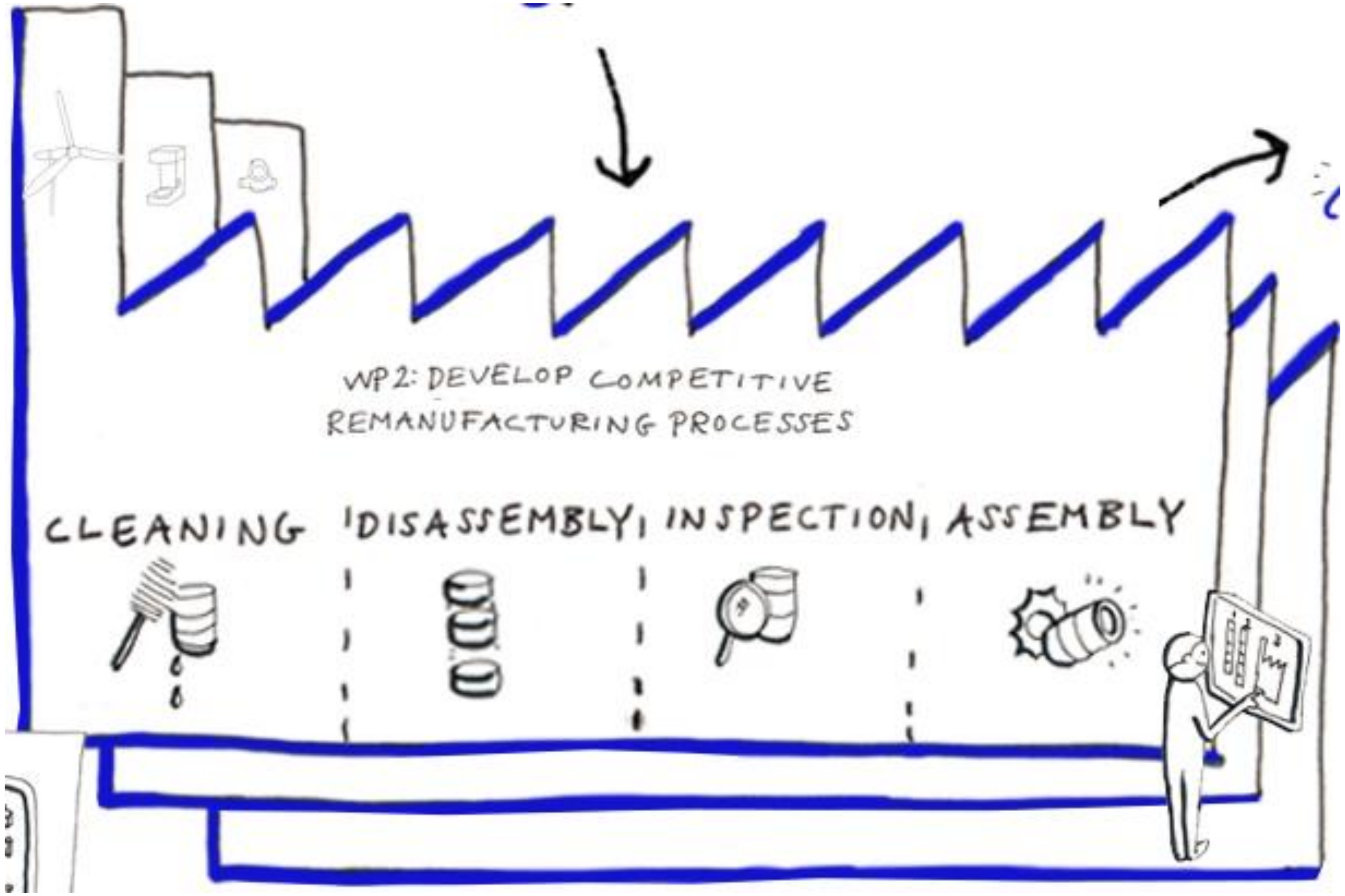
GOAL:
Boost the remanufacturing scalability potential in Danish manufacturing industry



T

REMANUFACTORY

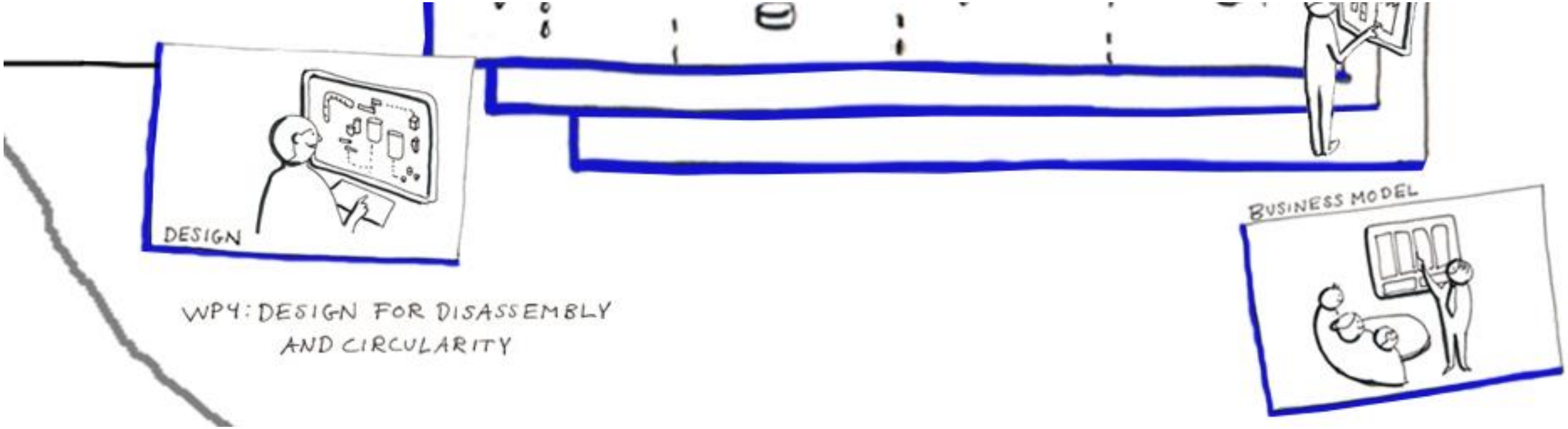
GOAL:
Boost the remanufacturing scalability potential in Danish manufacturing industry



T

REMANUFACTORY

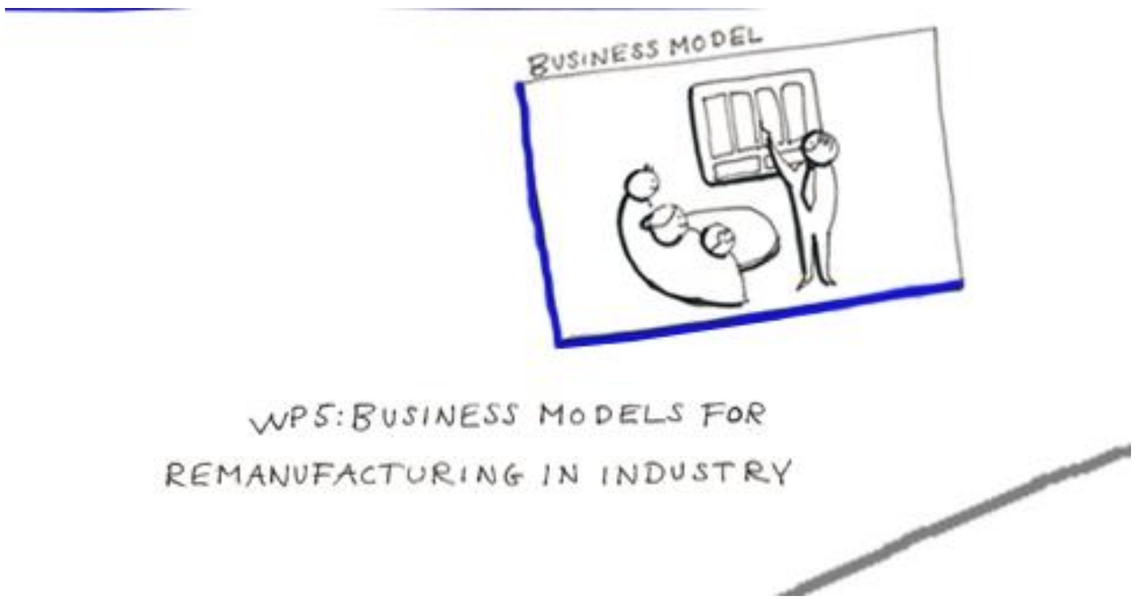
GOAL:
Boost the remanufacturing scalability potential in Danish manufacturing industry



T

REMANUFACTORY

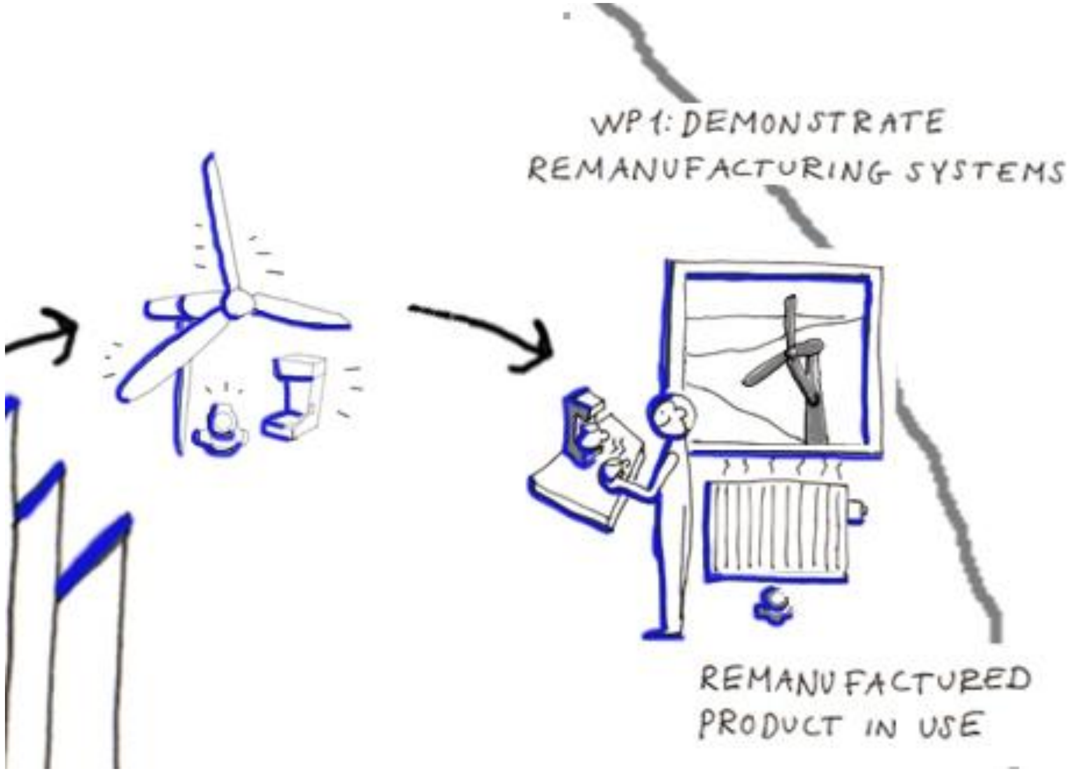
GOAL:
Boost the remanufacturing scalability potential in Danish manufacturing industry



T

REMANUFACTORY

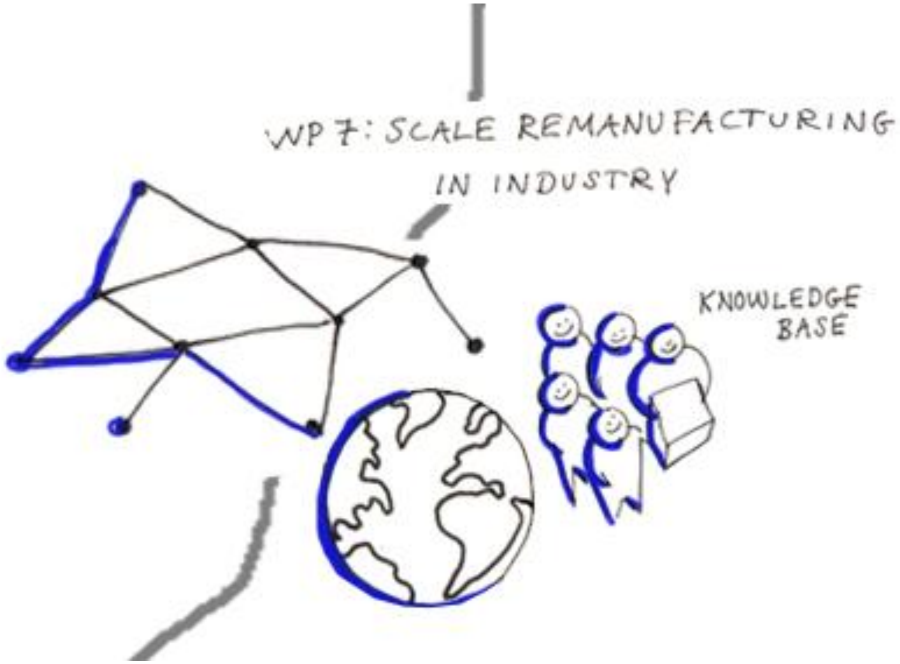
GOAL:
Boost the remanufacturing scalability potential in Danish manufacturing industry



T

REMANUFACTORY

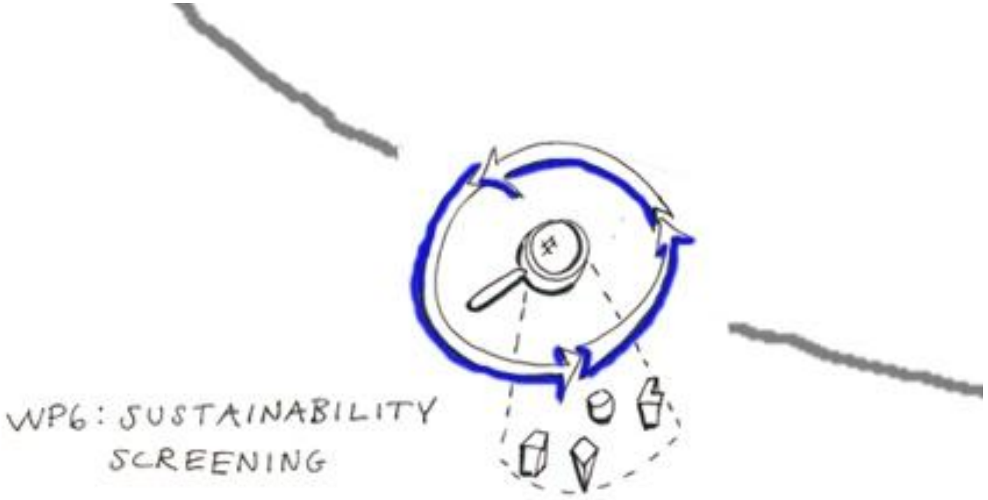
GOAL:
Boost the remanufacturing scalability potential in Danish manufacturing industry



T

REMANUFACTORY

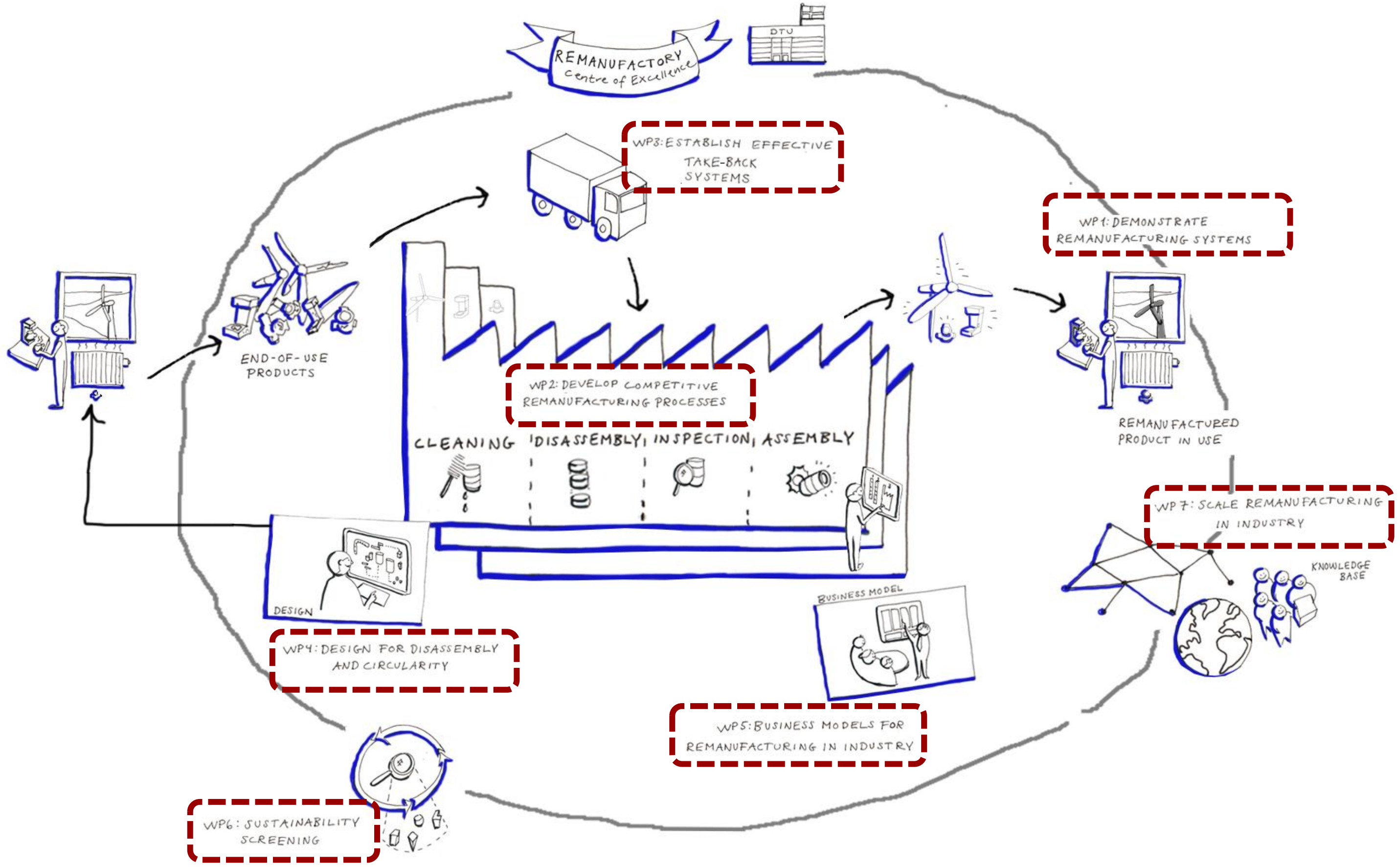
GOAL:
Boost the remanufacturing scalability potential in Danish manufacturing industry



T

REMANUFACTORY

GOAL:
Boost the remanufacturing scalability potential in Danish manufacturing industry



T

Collaboration mechanisms

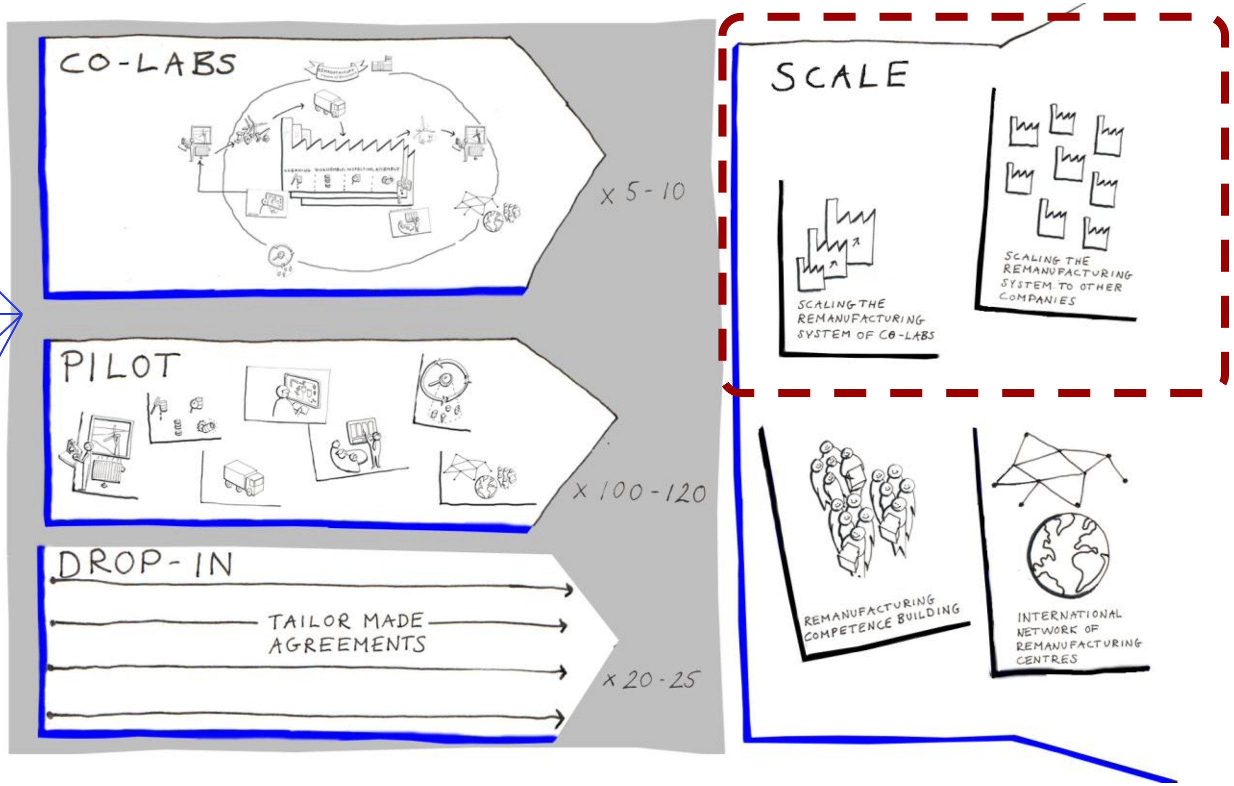
Ensuring that all companies have the same experience at the same time as addressing their specific needs

Well-defined collaboration process for each engagement model

Systematic approaches developed within each WP

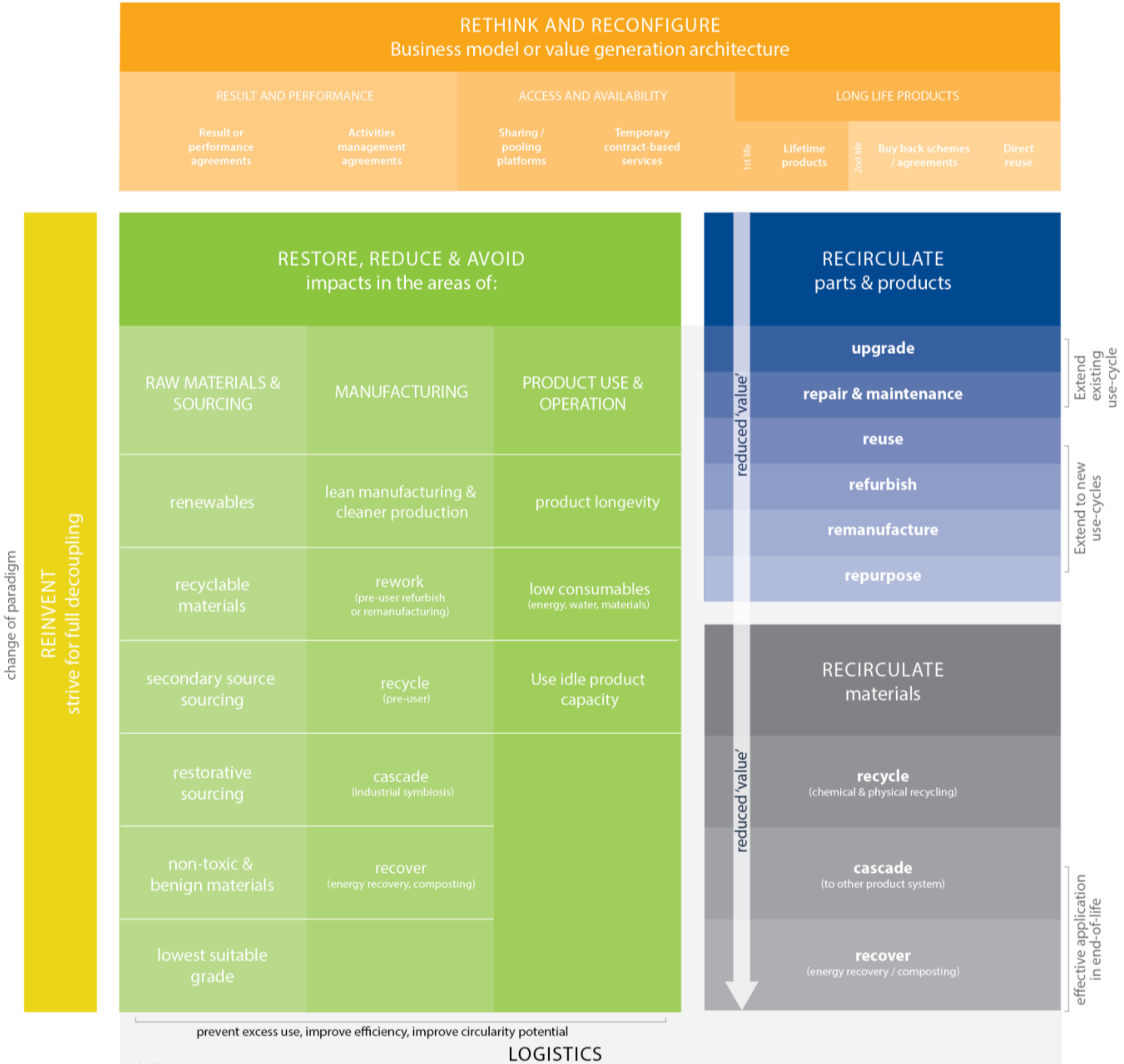
Daily engagement with a permanent contact person

Strong alignment between project partners



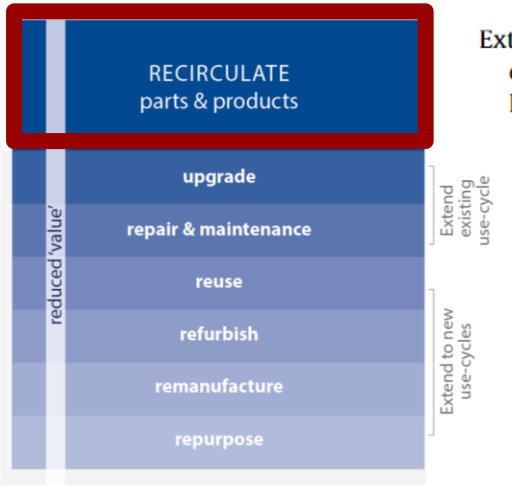
D

REMANUFACTURING DEFINED

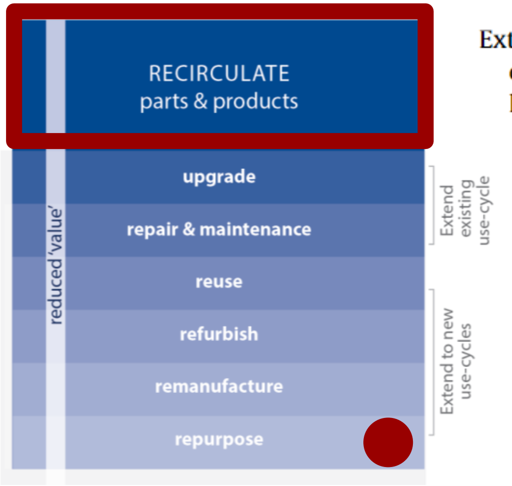


Thirty two opportunities to go circular!

- The ***Circular Strategies Scanner*** helps to guide our circularity transition



Extend existing use cycles with the purpose of capturing (residual) value or to reduce value loss from continued use of parts and products



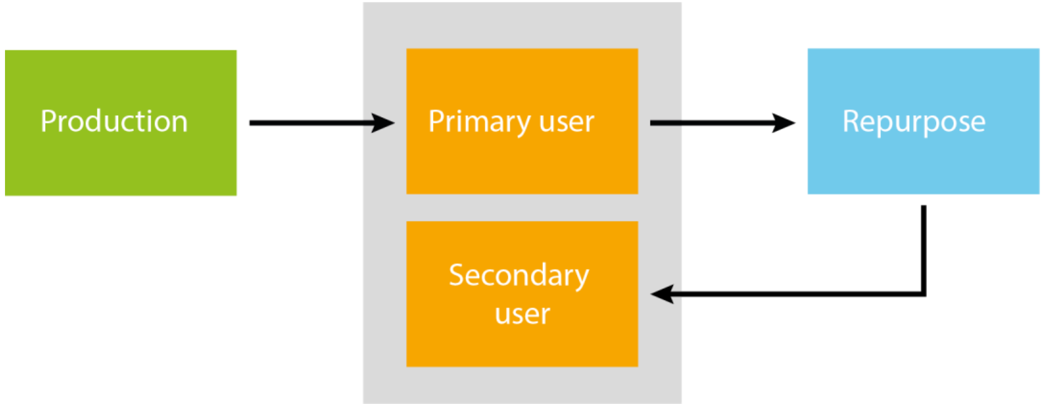
Extend existing use cycles with the purpose of capturing (residual) value or to reduce value loss from continued use of parts and products

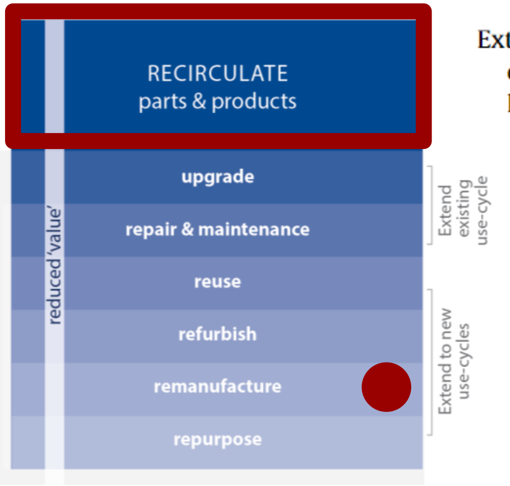
WallPipe

<u>Repurpose</u> — Alternate use.

Extend to new use cycles by using a product (discarded/not in use) or its parts for different functions (Potting et al., 2017; Reike et al., 2018).

- Mærsk providing containers to fit housing purposes in Copenhagen Village.
- Using product packaging as storage or glassware (Nutella, Douwe Egberts).

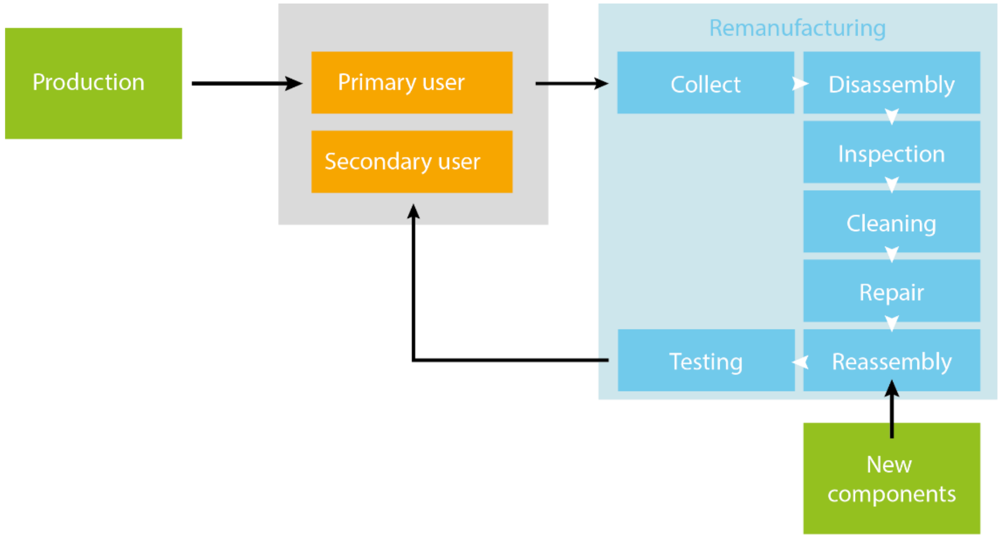


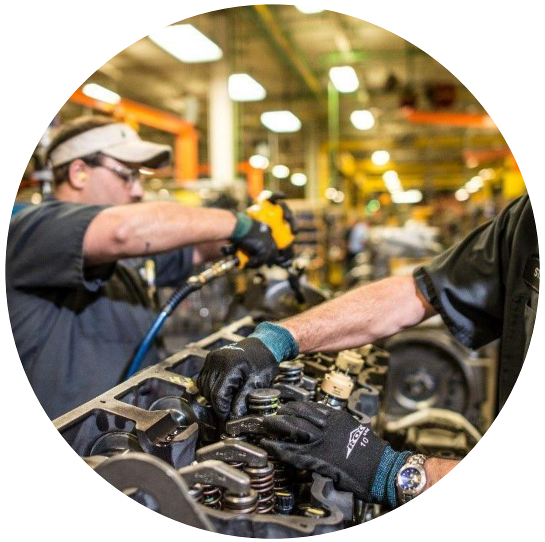


Extend existing use cycles with the purpose of capturing (residual) value or to reduce value loss from continued use of parts and products

<u>Remanufacture</u> — Rebuild, overhaul, remake.
Extend to new use cycles by returning a product (discarded/not in use) to at least Original Equipment Manufacturer (OEM) performance specification and quality. (Usually more rigorous and costly than refurbishment and involves total disassembly and reassembly. In the case of traditional product sales, a warranty that is at least equal to that of a newly manufactured equivalent may be issued). (Ijomah, 2002, 2009; Saavedra et al., 2013).

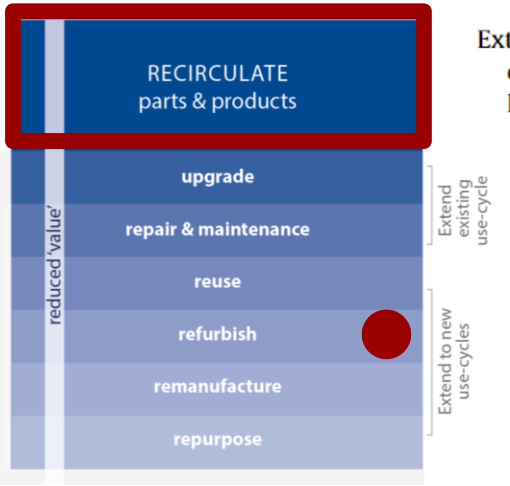
- Renault engine blocks





Caterpillar

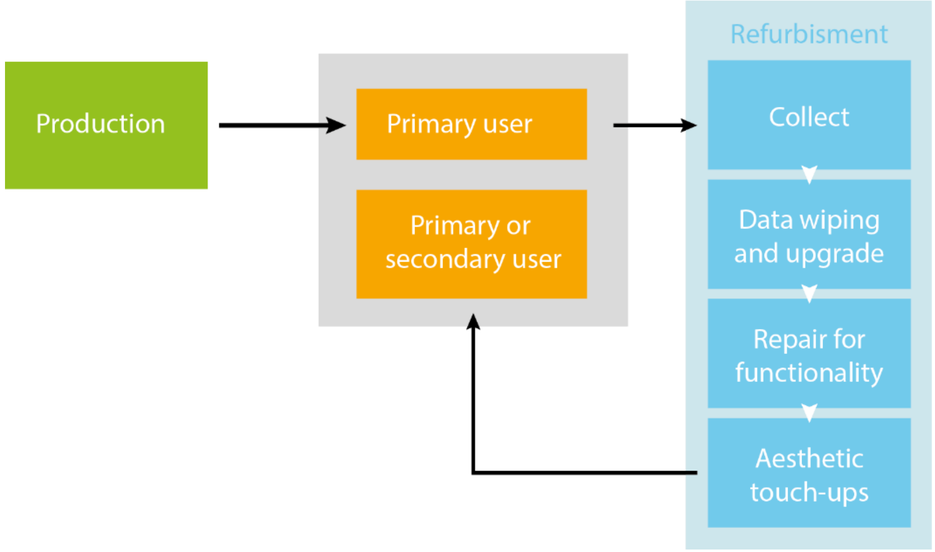
Refurb



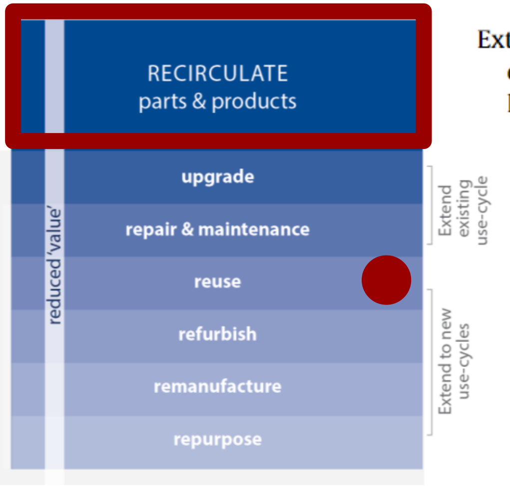
Extend existing use cycles with the purpose of capturing (residual) value or to reduce value loss from continued use of parts and products

Refurbish — Recondition, retrofit, refresh, remodel.
Extend to new use cycles by returning a part/product (discarded/not in use) to a satisfactory working condition that may be inferior to the original specification. (This may involve: cleaning, repairing, resurfacing, repainting, re-sleeving. Partial disassembly envisioned. In the case of traditional product sales, a warranty for all major parts may be issued (less than the newly manufactured equivalent)).* (Ijomah, 2002, 2009; Saavedra et al., 2013).

- For example: taking in relatively modern, but disused white goods and performing repairs and/or replacing lost parts and finding new users for the refurbished products (e.g. Norsk Omburk).



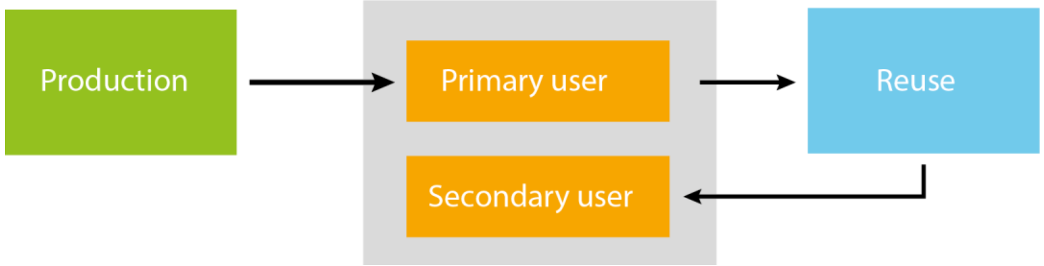
Red Cross



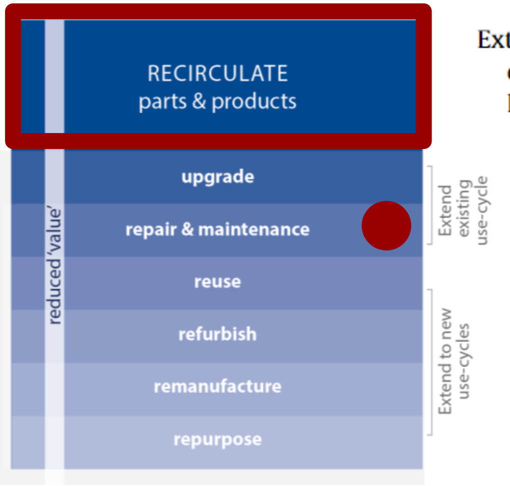
Extend existing use cycles with the purpose of capturing (residual) value or to reduce value loss from continued use of parts and products

Reuse — As-is reuse, redistribution, product cascading, minimise.
Extend to new use cycle by reusing a part/product (discarded/not in use) that is still in good condition and can fulfil its original function in a different use context (new customer/user). (May involve a minimum amount of condition monitoring such as cleaning or repackaging. No warranties are provided and no disassembly is involved.) (Saavedra et al., 2013)

- Selling used goods on platforms such as E-bay,
- Return and resale of second hand goods through stores, such as Patagonia and Bergans.
- The xStorage Home system (by Nissan and Eaton) gives old lithium-ion batteries from Nissan Leaf a second life inside of homes and businesses as backup and solar storage batteries.



Repair Cafés

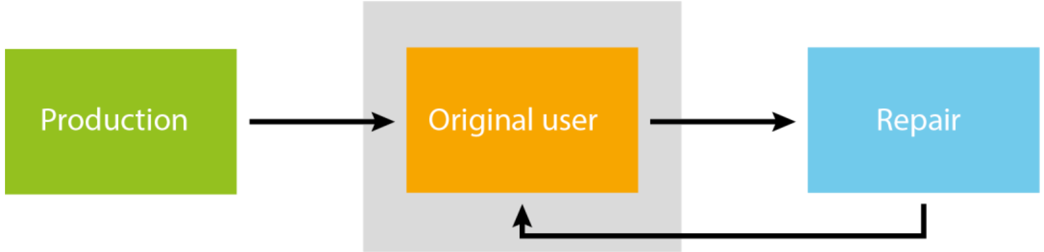


Extend existing use cycles with the purpose of capturing (residual) value or to reduce value loss from continued use of parts and products

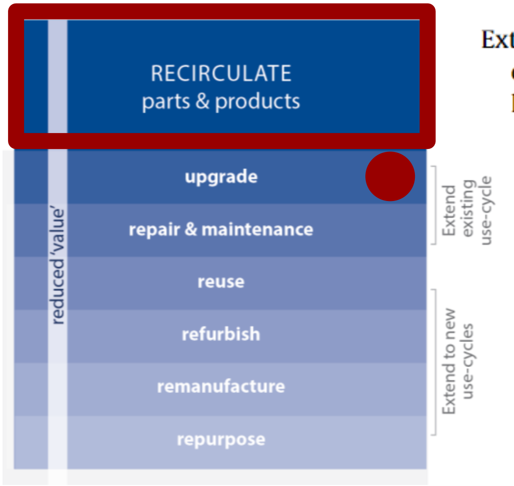
<u>Repair & maintenance</u> – Corrective, condition based, predictive and prescriptive maintenance

Extend existing use cycle by countering wear and tear, and correcting faulty components of a defective product/part to return it to its original functionality. ((Partial) disassembly envisioned, limited warranty may be issued). (Thierry et al., 1995; Stahel, 2006).

- Providing a product with a service, which may involve the lubrication of critical parts, checking fasteners, the tension of chains and cables, the replacement of worn-out parts, etc.
- Repair may involve the restoration or replacement of faulty parts and components.



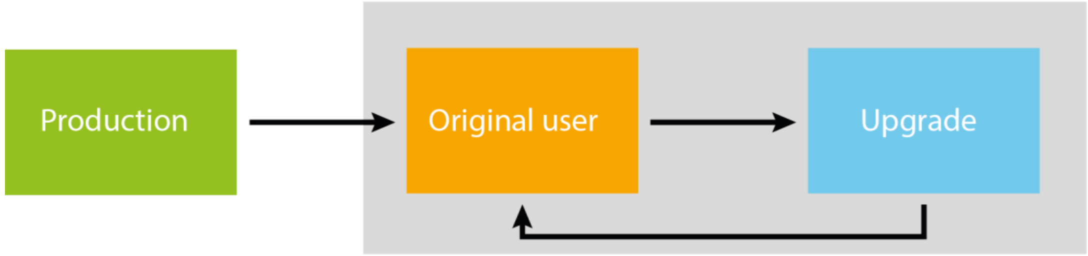
Fairphone

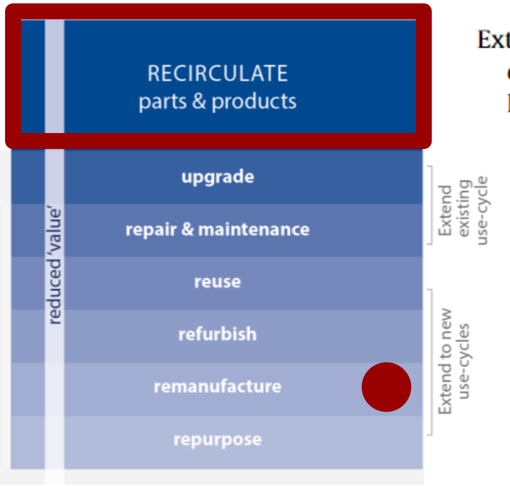


Extend existing use cycles with the purpose of capturing (residual) value or to reduce value loss from continued use of parts and products

Upgrade — Update, modernize, renew, retrofit, rebuild, overhaul, revive.
Extend existing use cycle by adding value or enhancing the function of a product in respect to previous versions (Parkinson and Thompson, 2003; Potting et al., 2017).

- Aesthetic upgrades (i.e. changing the coat or sleeve of a product due to a new preference).
- Functional upgrades (i.e. software upgrades, hardware upgrades).

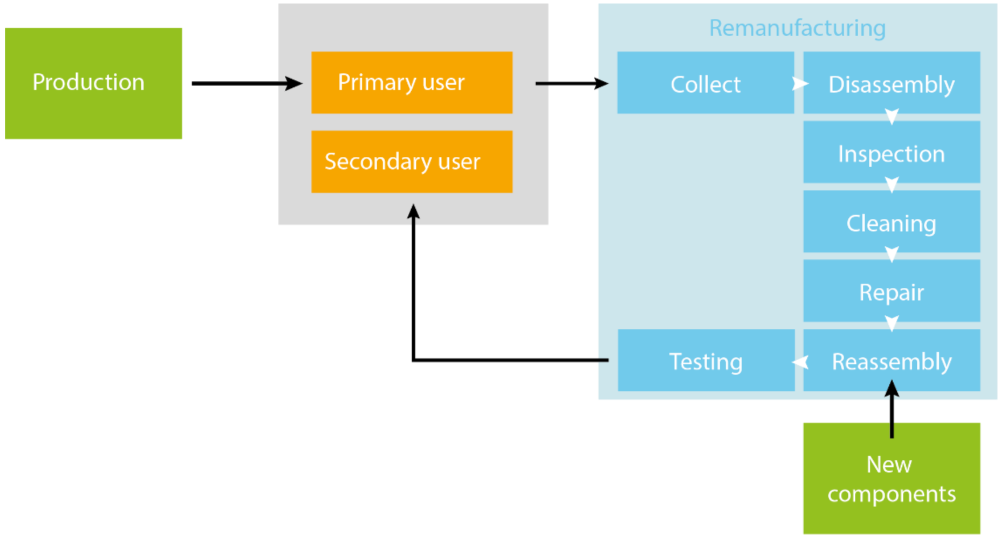


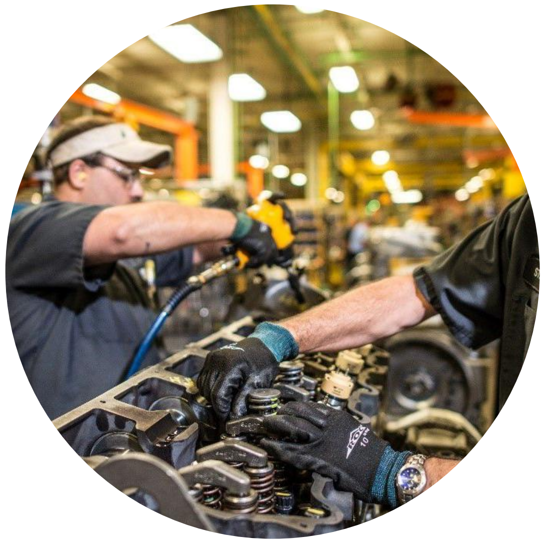


Extend existing use cycles with the purpose of capturing (residual) value or to reduce value loss from continued use of parts and products

<u>Remanufacture</u> — Rebuild, overhaul, remake.
Extend to new use cycles by returning a product (discarded/not in use) to at least Original Equipment Manufacturer (OEM) performance specification and quality. (Usually more rigorous and costly than refurbishment and involves total disassembly and reassembly. In the case of traditional product sales, a warranty that is at least equal to that of a newly manufactured equivalent may be issued). (Ijomah, 2002, 2009; Saavedra et al., 2013).

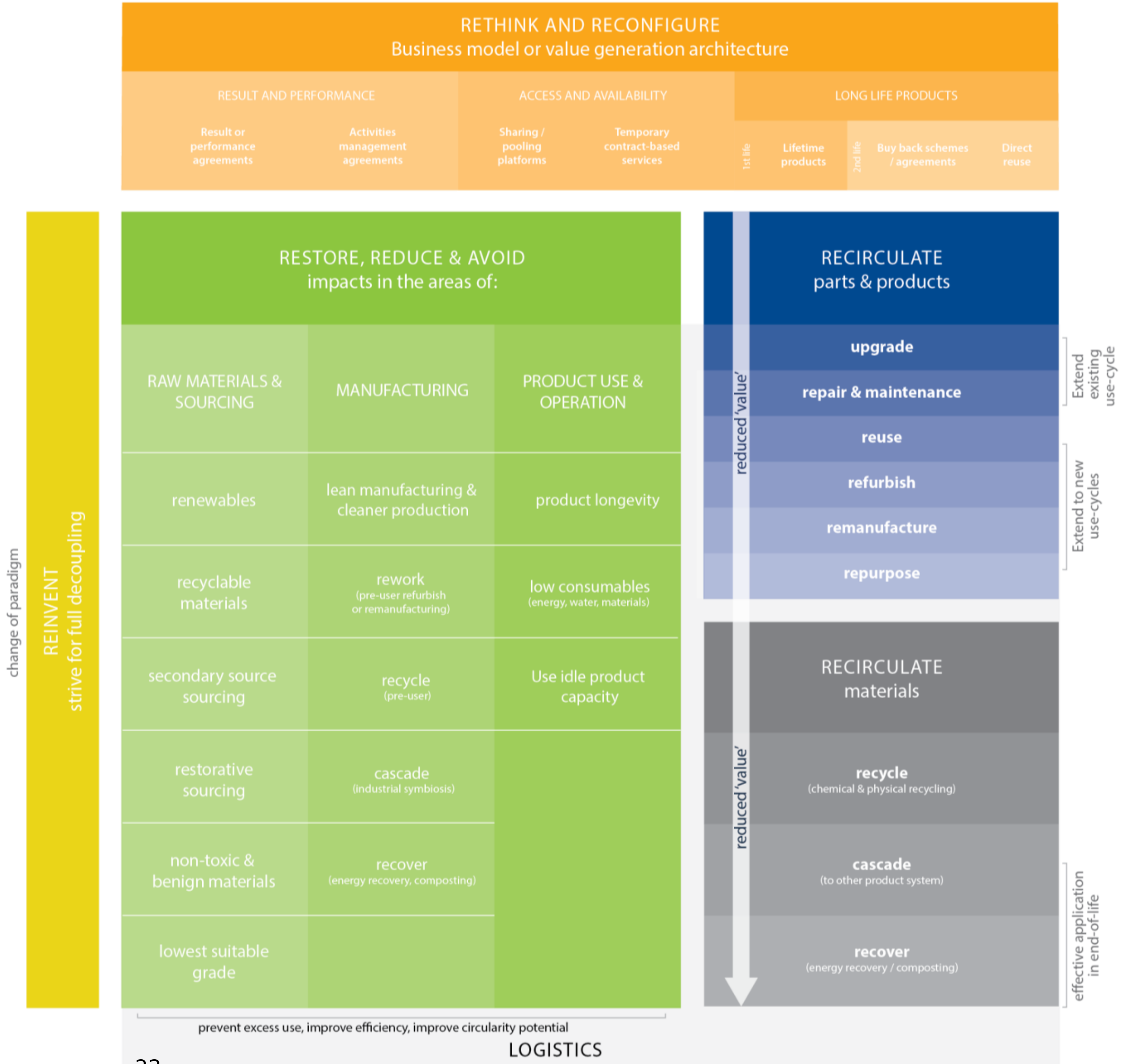
- Renault engine blocks





Caterpillar

REMANUFACTURING DEFINED



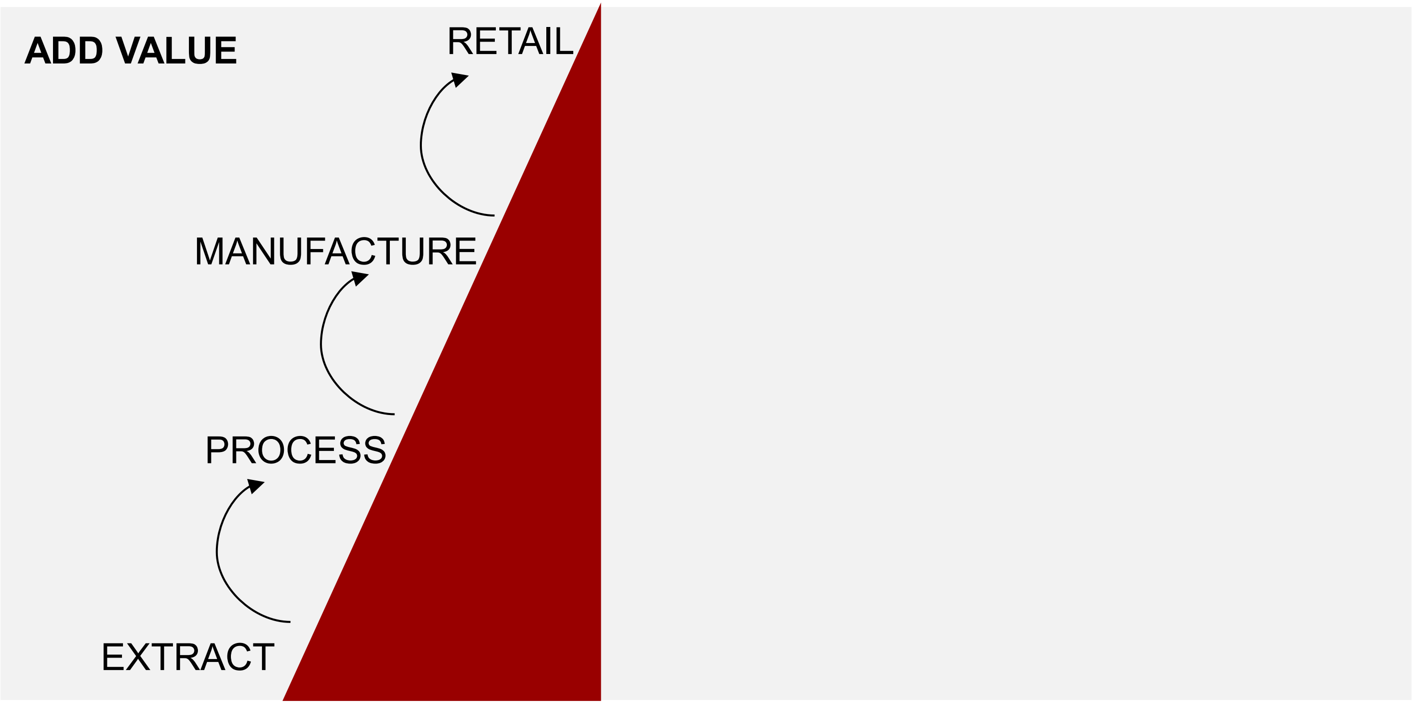
Thirty two opportunities to go circular!

- The ***Circular Strategies Scanner*** helps to guide our circularity transition

WHY REMANUFACTURING?

T

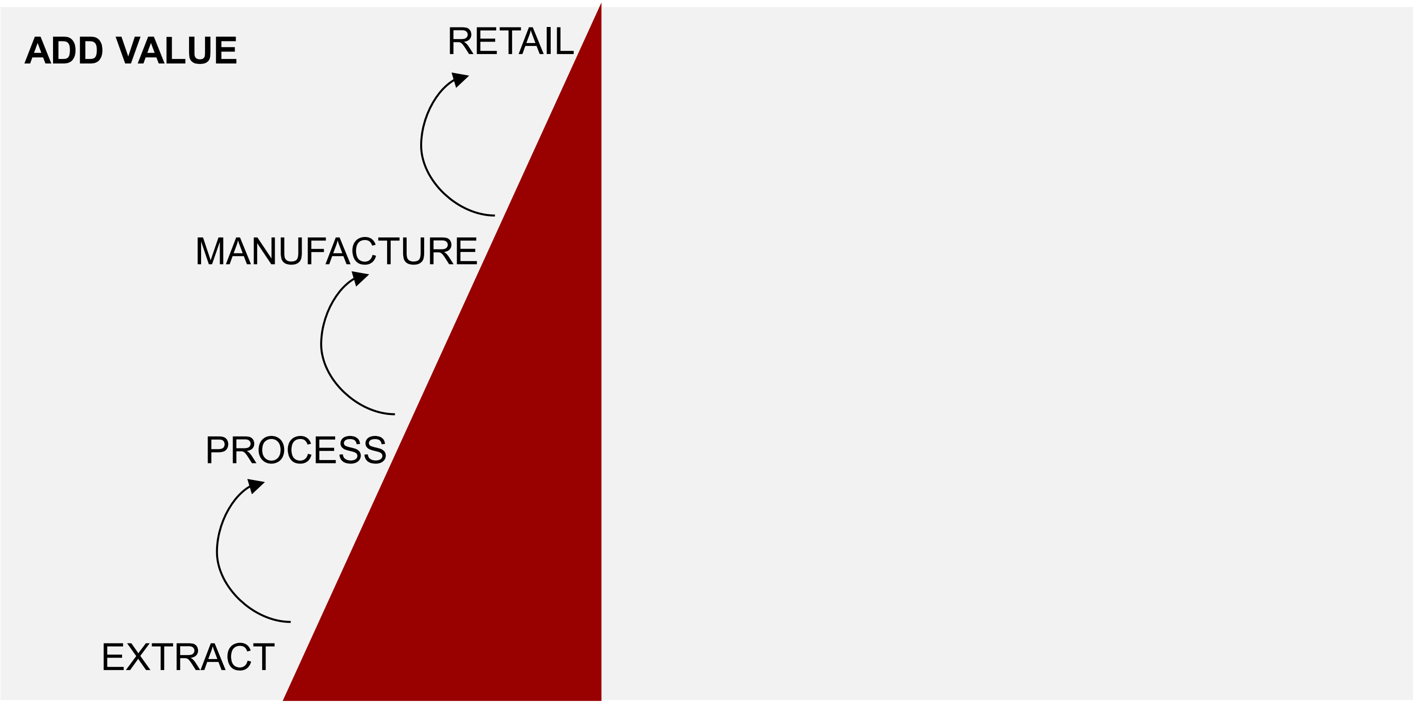
WHY REMANUFACTURING?



MANUFACTURING

T

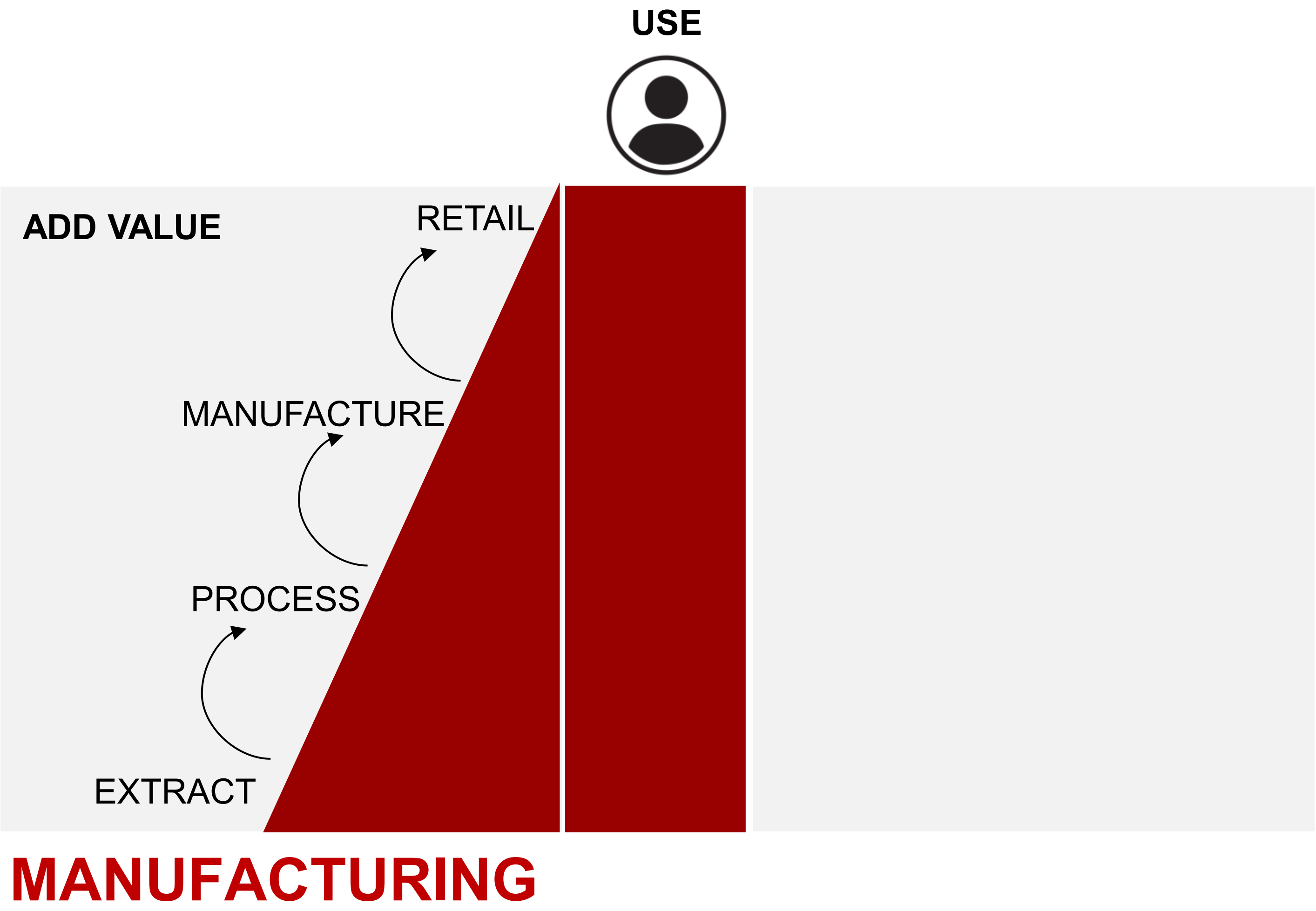
WHY REMANUFACTURING?



MANUFACTURING

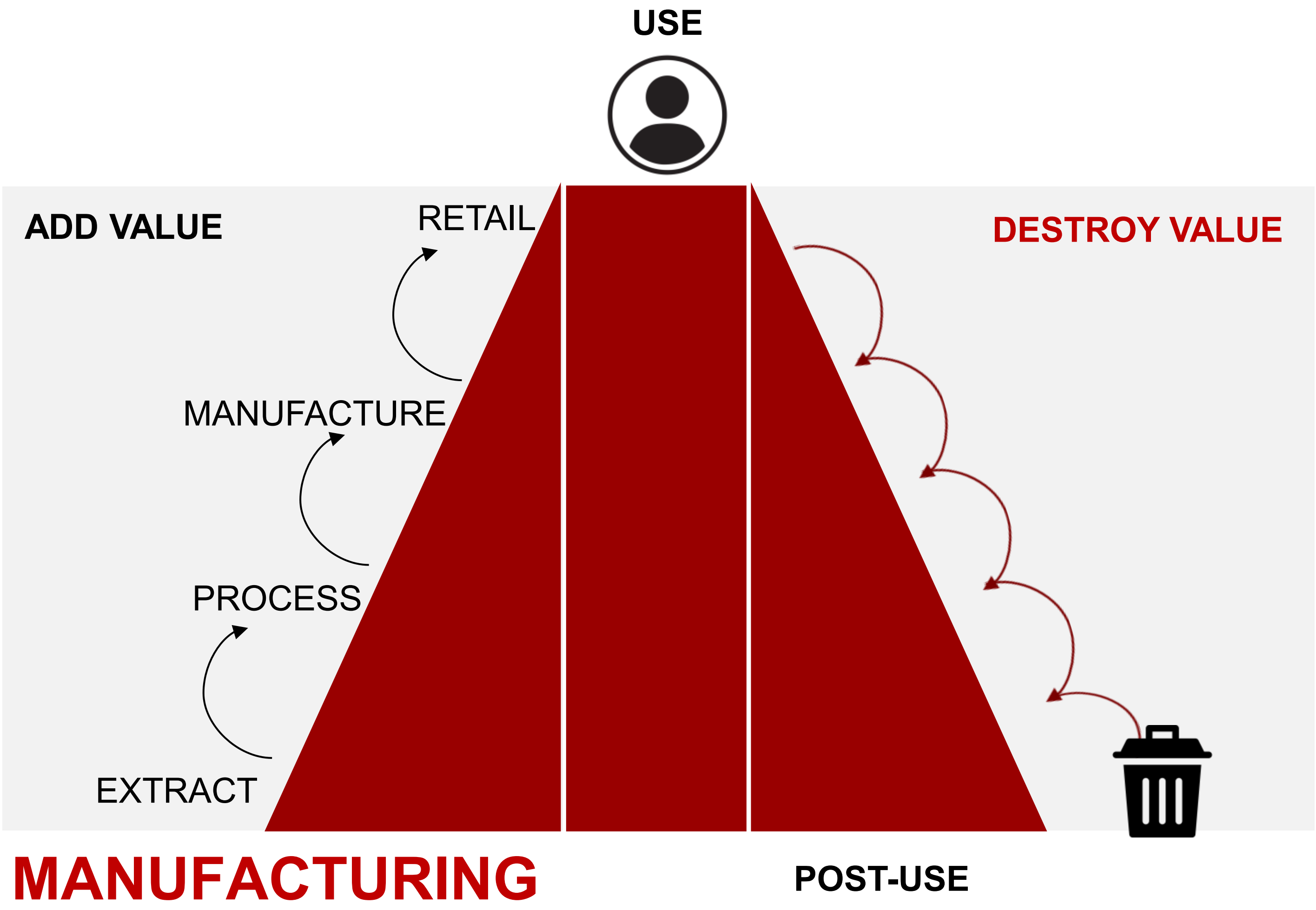
T

WHY REMANUFACTURING?



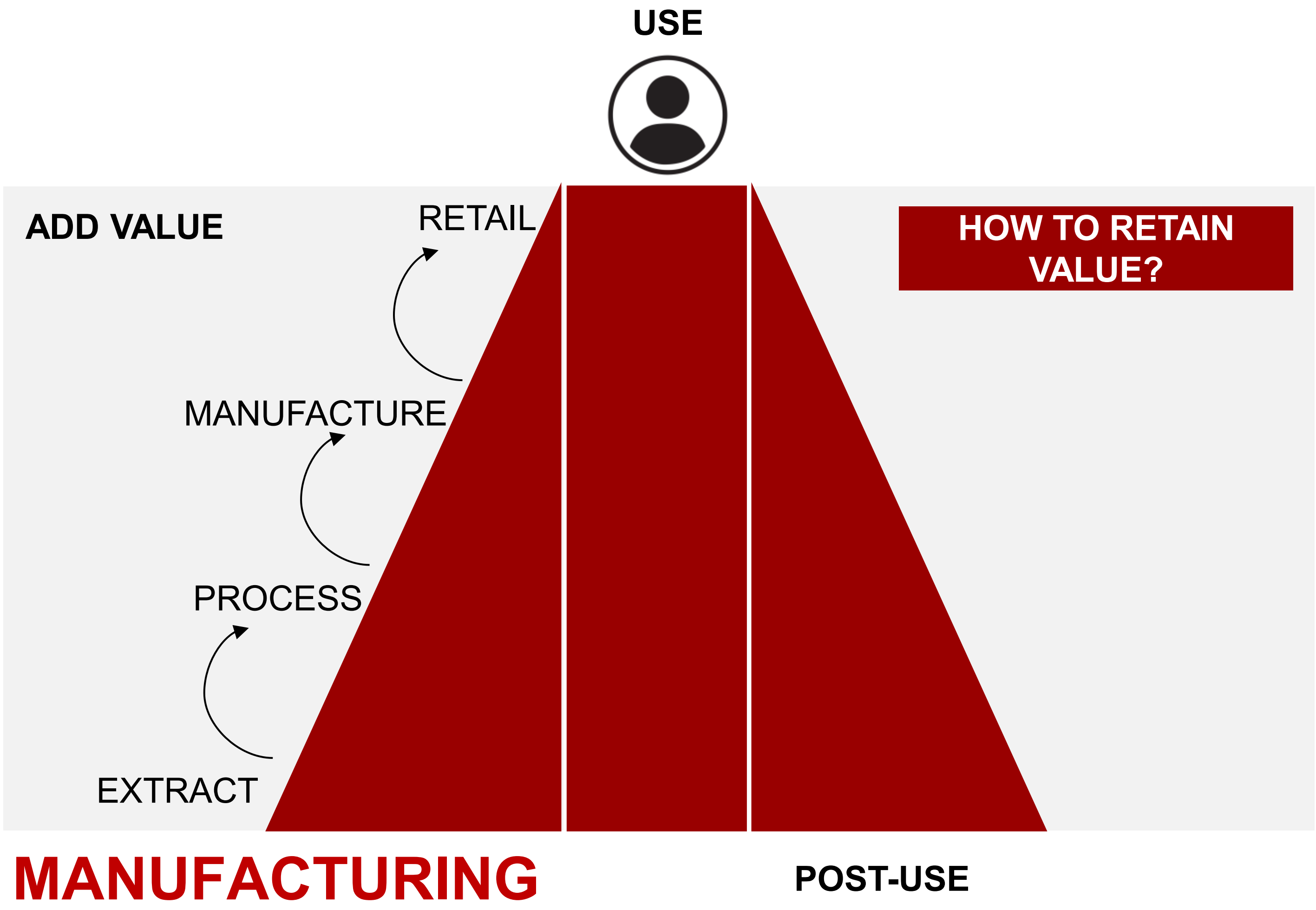
T

WHY REMANUFACTURING?



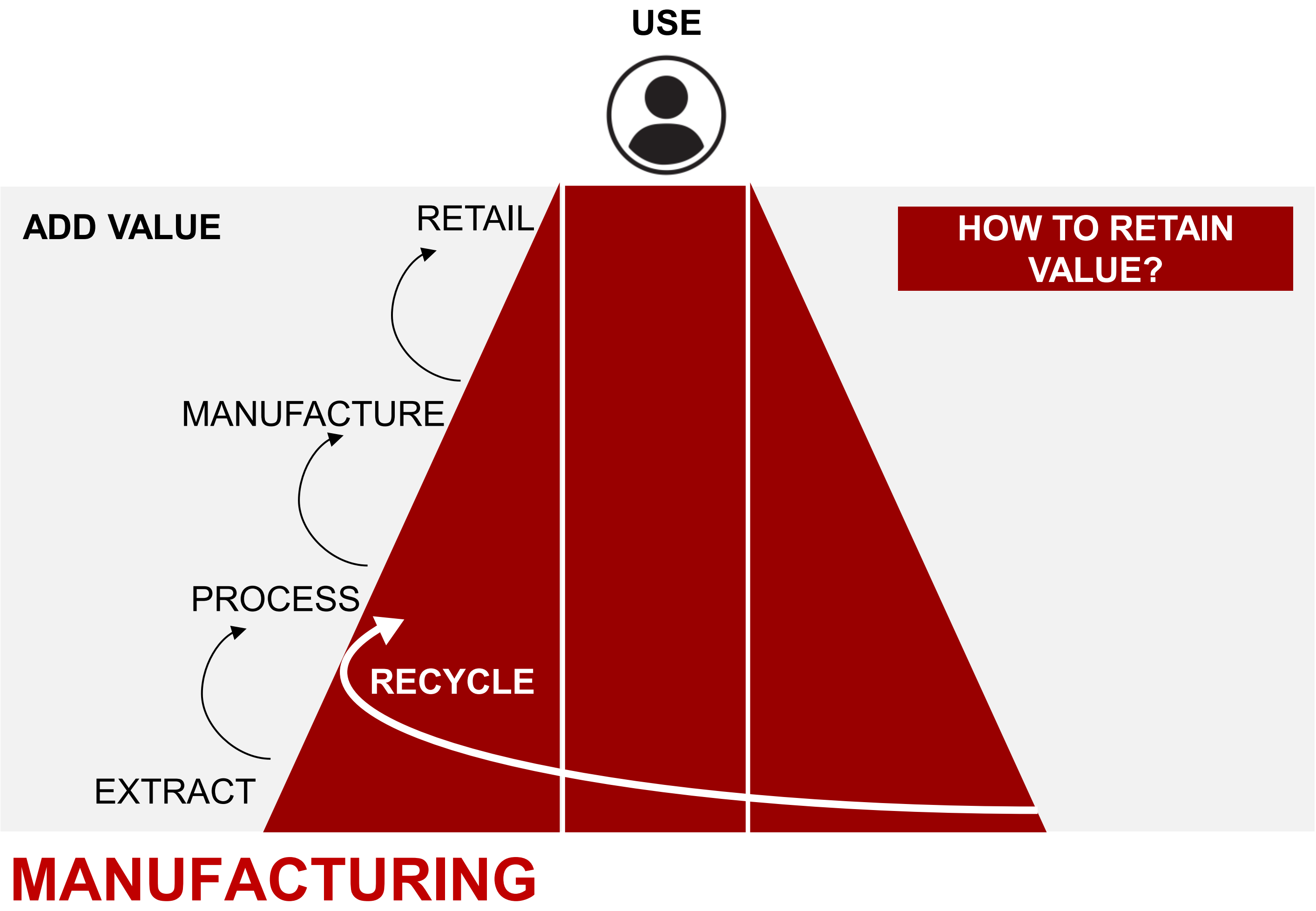
T

WHY REMANUFACTURING?



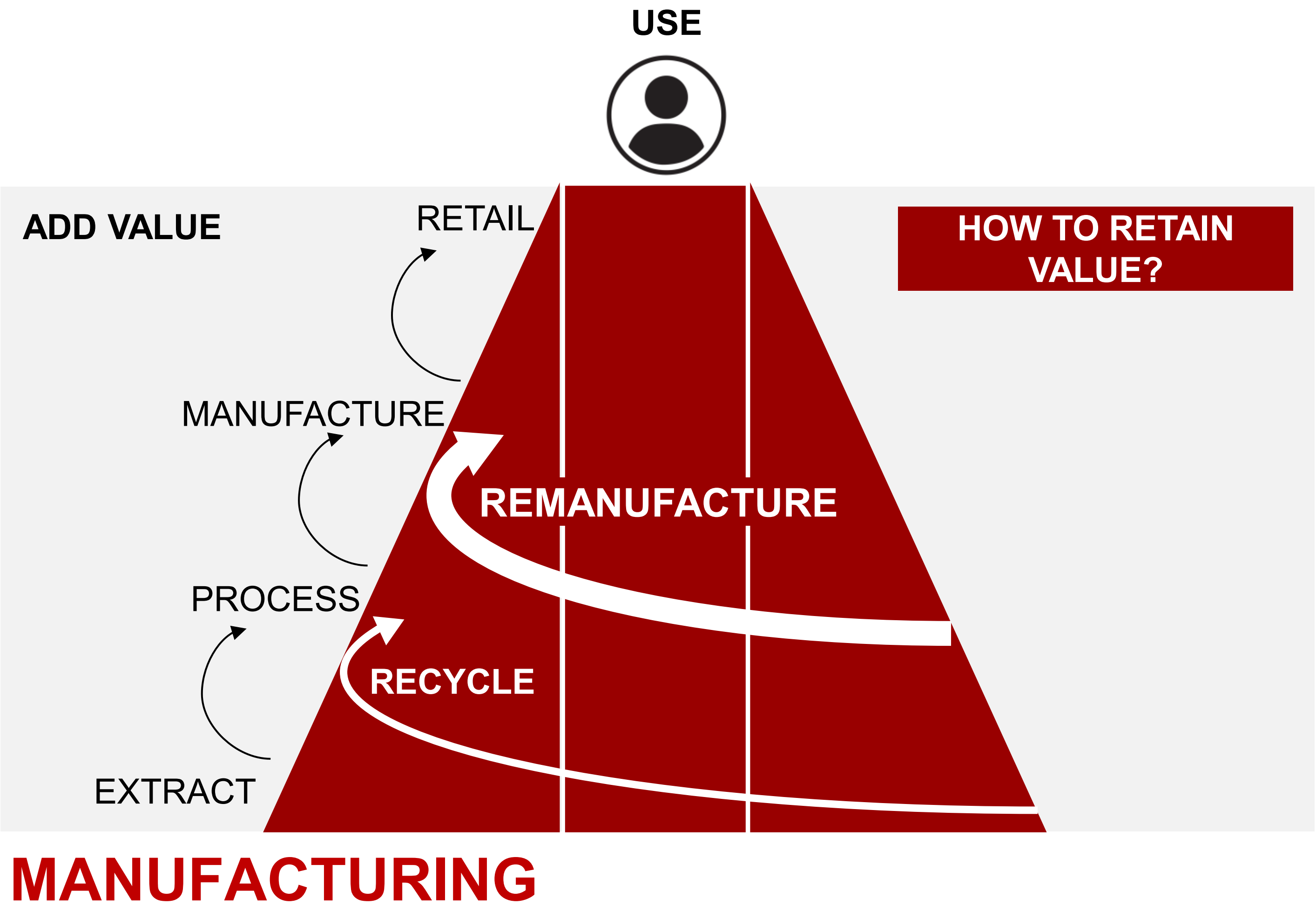
T

WHY REMANUFACTURING?



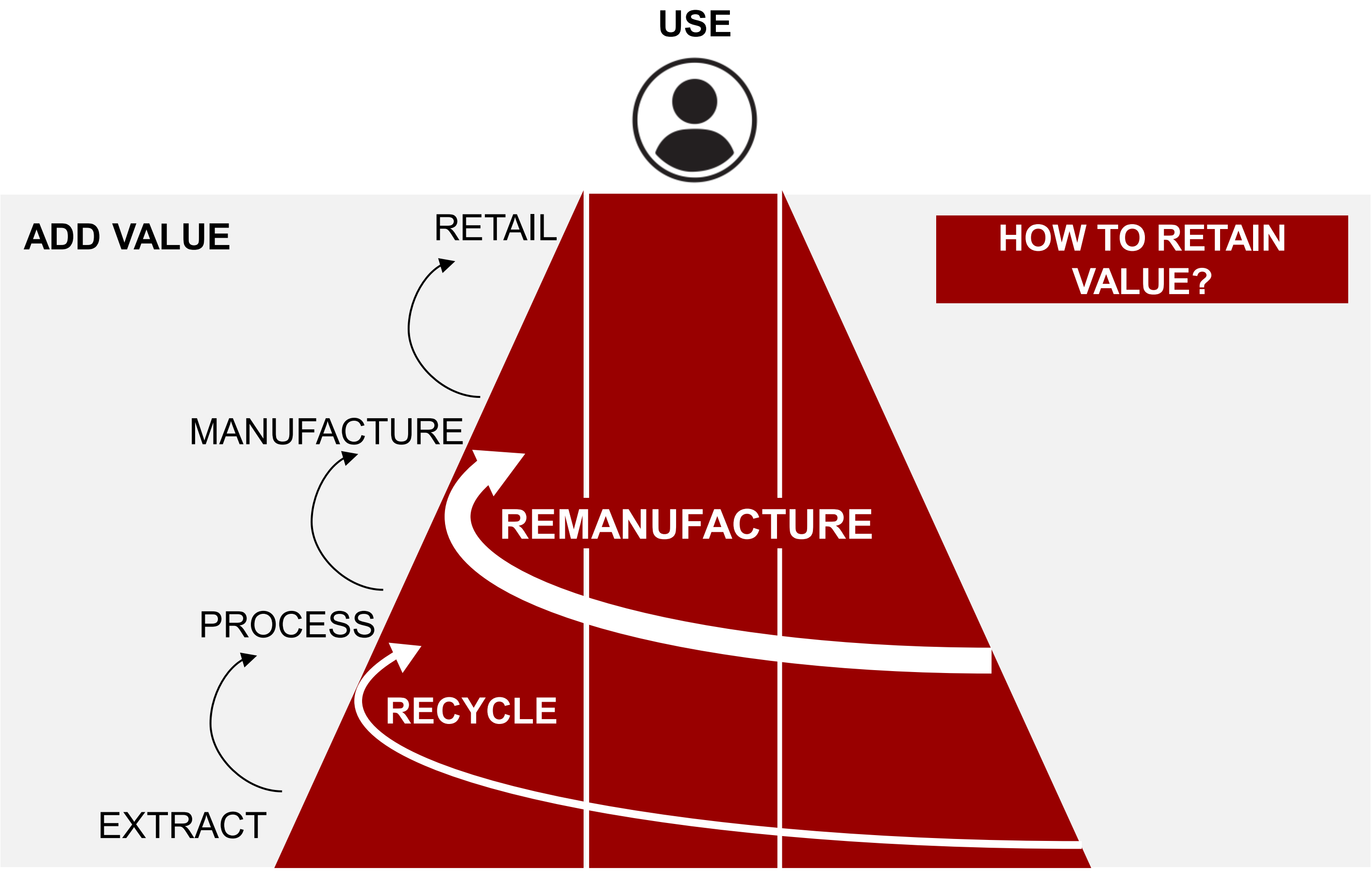
T

WHY REMANUFACTURING?



T

WHY REMANUFACTURING?



REMANUFACTURING
keeping the highest possible value,
restoring products to a as-new quality

T

DTU INDUSTRIENS FOND

reManuFactory

Ensuring circularity through full-cycle technology deployment and scaling

Technology + Talent + Knowledge + Network + Demonstration = Transformation + Scalingu.dk

Jakub Rubinowski
Email: jakru@dtu.dk
Tel: 5119 5591
LinkedIn

T

DTU